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EL-603/SW&P/6th Sem/2018/J/A

SWITCHGEAR AND PROTECTION

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer both Part-A and Part-B.

PART – A

Marks – 25

1. Fill in the blanks : 1×10=10
- (i) _____ relay is used for protection of transformers.
- (ii) A _____ is a current interrupting device.
- (iii) Capacitive current breaking results in _____.
- (iv) If the length of the arc increases, its resistance is _____.

[Turn over

- (v) Induction relays are used with _____ quantities.
- (vi) Buchholz relay is placed between _____ and conservator.
- (vii) Arcing ground can be prevented by earthing the _____.
- (viii) The actuating quantity for the operation of distance relay is the _____ of the line.
- (ix) The minimum current in the relay coil at which the relay starts to operate is known as the _____.
- (x) _____ Oil CBs use oil for arc-quenching only.

2. State true or false : $1 \times 10 = 10$

- (i) The most severe surges on the line are produced by lightning.
- (ii) A fuse wire should have low specific resistance and high melting point.
- (iii) MHO relay is used for transmission lines.
- (iv) The most important stator winding fault of an alternator is earth fault.

- (v) A relay performs the function of current interruption.
- (vi) A fuse is never inserted in neutral wire.
- (vii) In HRC fuse, the time between cut-off and final current-zero is called the prearcing time.
- (viii) SF_6 gas has excellent heat transfer properties because of its higher molecular weight.
- (ix) Impedance relays can be used for phase faults only.
- (x) Earthing of electrical equipment is necessary for the protection against voltage fluctuations.

3. Choose the correct words from those given within brackets : 1×5=5

- (i) Differential protection scheme for longer lines is _____ costly. (more/less)
- (ii) The parallel feeders _____ be protected by non-directional over-current relays alone. (can/cannot)
- (iii) In sub-stations, the most commonly used type of arrester is _____ arrester. (Thyrite/horn gap/rod gap)

- (iv) Cross-jet explosion pot can interrupt _____ short circuit currents easily. (heavy/low)
- (v) The _____ lightning systems are very rare on the power system. (direct/indirect)

PART – B

Marks – 45

Answer any *five* questions.

1. Distinguish between : 9
- (i) Fault and abnormality
 - (ii) Short-circuit and overload
2. Define the following : 9
- (i) Restriking voltage and RRRV
 - (ii) Recovery voltage and active recovery voltage
- Give the diagrammatic representation of the above.
3. Describe the working principle of a directional over-current relay with the help of a neat sketch. 9
4. Explain the working of the H.R.C fuse with necessary diagrams. Distinguish between HRC fuse and circuit breaker. 5+4=9

5. What is a voltage surge ?

Explain the lightning phenomenon.

List the different methods of over-voltage protection. $2+4+3=9$

6. Describe the following :

(i) Current chopping

(ii) Resistance switching.

$4+5=9$

7. Describe with the help of neat diagrams indicating the current flow, the Merz-Price protection of a Star-delta Transformer. 9

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